

Science

Atlas of crystallographic groups of symmetry. Moskva, Izd. Akademii nauk SSSR. 1946.

Monthly List of Russian Accessions, Library of Congress, September 1952. Unclassified.

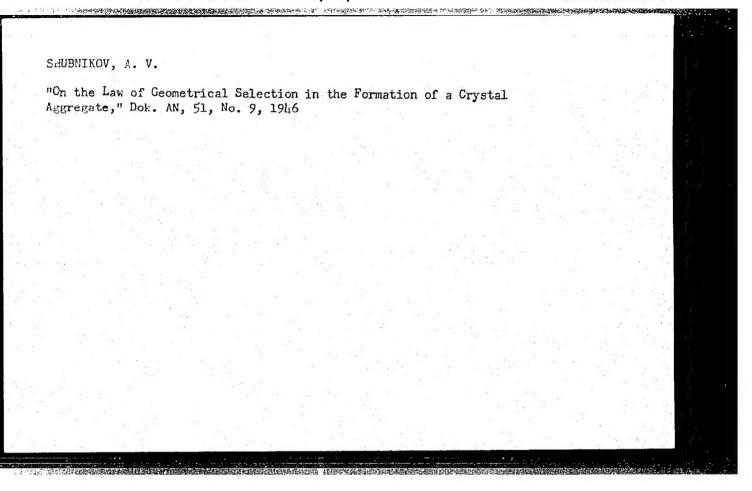
SHUBNIKOV, A. V. Academician

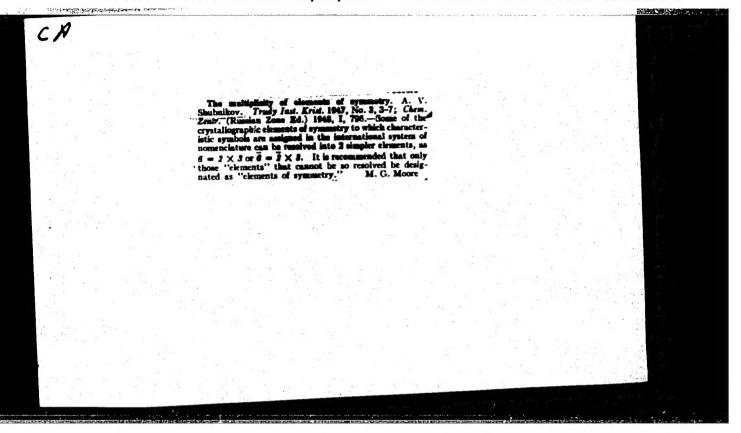
Corresponding Nember of Academy of Sciences of USSR

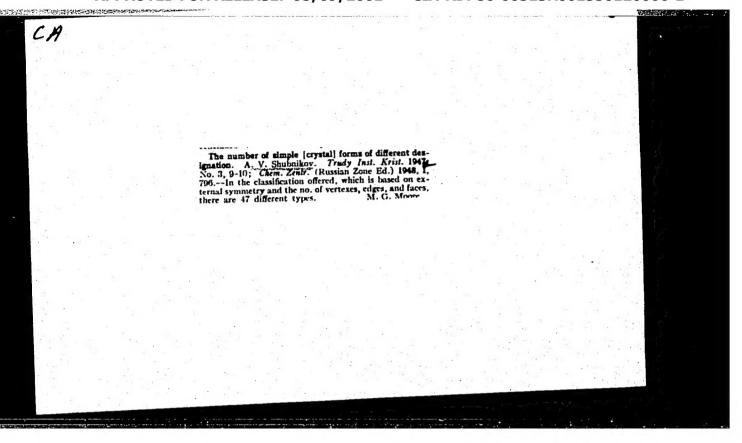
"Piezoelectric Textures" 1946

Soviet Source: N: Trud #133, Hoscow, 7 June 1947

Abstracted in USAF "Treasure Island", on file in Library of Congress, Air Information Division, Report No. 63457







SHUBNIKOV, A. V.

USSR/Acad Sci Crystals Magnets

Aug 1947

"June Session of Department of Physicom thematical Sciences" 1 p

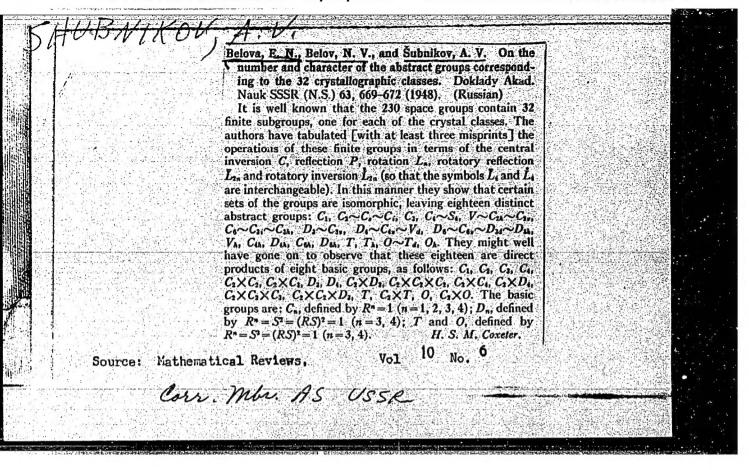
"Vest Akad Nauk SSSR" No 8

Session convened 9 Jun, and first article read was by V. K. Arkad'yev, Corresponding Member of the Academy of Sciences, on resonance in molecular magnets. Among other articles read were those by A. V. Shubinkov, Corresponding Member of the Academy of Sciences, and Director of the Institute of Crystallography; N. V. Belov; G. G. Lemmleyn; etc. More research and study was suggested on the physics of crystals.

PA 57T2

SHUBNIKOV, A. V. (Reviewer), G. M. Popov and I. I. Shafranovskiy

"Crystallography," (Moscow-Leningrad, State Geological Press, 1948) Reviewed by A. V. Shubnikov, Sov. Kniga, No. 5, 1948.



SHUBNIKOV, A. V.

Quartz

Piezoelectric effect in quartz twins. Trudy Inst. krist., No. 5, 1949

Monthly List of Russian Accessions, Library of Congress, December 1952. UNCLASSIFIED.

SHUBNIKOV, AV			
rectors and tensors. 13, 347–375 (1949). inguish between the f "material" figures, and properties of a a difference in the cess and a cube with control contro	one. The crystal cubes of rock etry of ordinary spheres, but to spheres without symmetry it orientation according to the ne of polarization. Since many shallography can be described isors the author proposes in this pt of the symmetry of vector the matrices cu, i, j=1, 2. rotations and reflections to rotations and reflections to orthogonal Cartesian axes in metry properties of polar vector axial vectors. The symbols to ity axes for an axis of infinite etry and to parallelism, etc. from the following table indistrensors. Situation of the saxes	arbitrary axis 2 coincides with the x-axis	
Subnikov, A.V. On the symmetry of vertons and tensors. Lzvestyn Akad. Nauk SSSR. Ser. Fiz. 13, 347–375 (1949). (Russian) It is useful in crystallography to distinguish between the symmetry of geometrical figures and of "material" figures, which are figures with certain additional properties of a physical nature. There is, for instance, a difference in the symmetry of a cube with six minetry of a cube with six white faces and a cube with five white faces and a cube with	salt have the optical symmetry of ordinary spheres, but those of sodium chlorate that of spheres without symmetry phones of sodium chlorate that of spheres without symmetry phones but with a left or right orientation according to the rotation character of the plane of polarization. Since many physical phenomena in crystallography can be described with the aid of vectors and tensors the author proposes in Unique to establish the concept of the symmetry of vector and tensors. Starting with the matrices of polar vectors and tensors. Starting with the matrices of polar vectors by stemstically tests the symmetry properties of polar vectors, is vivalent polar tensors, of axial vectors (bivalent polar tensors), and oil bivalent axial tensors. The symbols to indicate the groups of symmetry are of or an axis of infinite order, there are not a tensors of the indicating the symmetries of polar tensors. Symmetry of the Form of the Situation of the tensor tensor axes	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
	하다. 그 그 전 그가 그 역시대회학, 상대의 하약 기계의 등 사상님은 본 등의 현실이다. 기계를	2.	
Source: Mathematical Re	views, Vol ! No.5	Cind/y/	

SHUELIKCV A. V.

Aug 51

USSP/Physics - Piezoelectrics Rochelle Salt

"Oscillations of Textural Piezoelectric Plates of Rochelle Salt Crystal," V. P. Konstantineva

"Zhur Tekh Fiz" Vol XXI, No 8, pp 962-969

Shubnikov refers to his previous work (cf. "Iz Ak Nauk SSSR Ser Fiz" Vol VII, 166, 1944) in which he proved existence of piezolec textures. Here authors describe studies of square and rectangular plates under elec excitation from a sonic generator. Authors thank V. F. Parnov for exptl work. Submitted 31 Jan. 51

PA 149T100

SHUPMIKOV, A. V.	USSR/P	"Can a Cry Anisotropi "Uspekh Fi "Uspekh Fi "Considers relative to ot properties coexistenc properties isotropy a	
	hysics - Cr Lly possibl of some cr ent propert ist absolut	sics - Crys Pic?" A. V. Pic?" A. V. Fiz Nauk" V.	
	lls, Isc otropic lespite llograp are rel	Crystals, Isotropic and Anisotropic Be Simultaneously Isotropic and V. Shubnikov A. V. Shubnikov A. V. Shubnikov That crystals may be isotropic ne properties and anisotropic relative to so sym sphere relative to others. Sapparently contradictory and excipas discontinuity and continuity nisotropy, etc., in same crystal	eser D
	c and td) nableness Argument and symme	me of	
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"APPROVED FOR RELEASE: 08/09/2001

CIA-RDP86-00513R001550120006-1

SHUBNIKOV, A. V.

PA 240T106

USSR/Physics - Reticulate Patterns

Dec 52

"Effects of Superposition of Reticulate Patterns,"

A. V. Shubnikov

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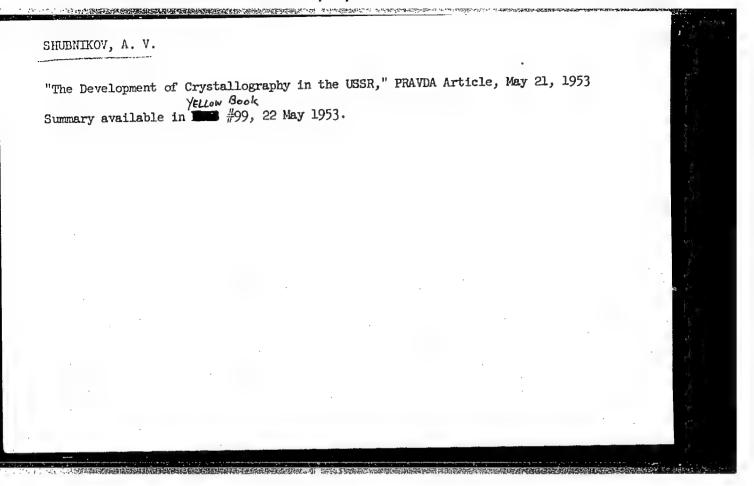
"Zhur Tekh Fiziki" Vol 22, No 12, pp 2038-2060

Describes previously known phenomena of formation of secondary magnified images of reticulate systems during superposition of two patterns and a number of other yet unknown phenomena of magnified patterns during superposition with perforated rasters. Clarification of phenomena and new laws are derived. Received 6 Sep 52.

2407106

- 1. SHUENIKOV, A. V.
- 2. USSR (600)
- 4. Crystallography
- 7. Crystallography in the service of the national economy, Priroda, 41, No. 11, 1952.

9. Monthly List of Russian Accessions, Library of Congress, February, 1953. Unclassified.



SHUBNIKOV, A.V.

Maxwell's law for optical anisotropic mediums. (In: Akademiia nauk SSSR. Voprosy petrografii i mineralogii. Moskva, 1953. Vol. 2, p.421-426)

1. Chlen-korrespondent Akademii nauk SSSR. (Optics)

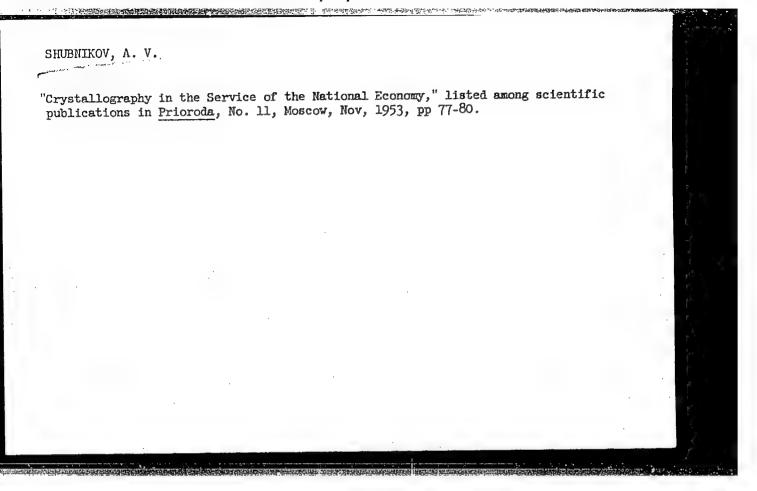
Physical Properties of Synthetic Com (Fizicheskie Svoistva Sinteticheskogo Korunda). Rdited by A. V. Shurmikov. M. V. Klassen-Nerlyudova, and S. V. German. Trudy Int. Krid. Abad Nant SSSR No. 8 GERHWAILD, Trudy Int. Krid. Abad. Nant. S.S.R. No. 8, 356 pp. (1953). Price R10.—The symposium was held in 1950 to give to the synthetic corundum industry a complete survey of the methods and results of scientific investigations, especially concerning optical and mechanical properties. The boule has been chiefly studied because an accurate knowledge of crystallographic orientation is the basis of every working process. The optical characteristics and structural properties of real (mosale) crystals are therefore emphasized. The instruments used for the investigations are partly newly constructed and may be particularly recommended for studies of the physical properties of monocrystals other than those of synthetic corundum. References are given with each paper. Results of laboratory research on different properties of synthetic corundum crystals. S. V. GRUM-GRZHIMAÎLO AND M. V. KLASSEN-NERLYUDOVA. Ibid., pp. 5-12.—The influence of impurities, e.g., Cr₂O₂, MgO₃. SiO₂, Fc₂O₃, T:O₂, V₂O₄, CaO₃-MnO₄ and CuO₄ is discussed. Basic E. S. RUDNITSKAVA. Ibid., pp. 13-20. Thermal constants of a-Al₂O₁. L. G. Chentsova, Ibid., pp. 21-26. Thermal constants of a-Al₂O₁. L. G. Chentsova, Ibid., pp. 21-26. Thermachemical data are compiled. Properties of isomorphous mixes of AliO, and CriO; S. V. GRUM-GRZHIMATLO. Ibid., pp. 27-34. The dimensions of the elementary cells and the fusion points of the crystalline solutions are given, together with data on densities and refractive indices, absorption spectra, and pleochroic phenomens. Describes of synthetic coveradom, especially the effects of crystalline selections with Cr₂O₁. B. N. SLAYNOYA AND I. N. SLAYNOYA, Ibid., pp. 35–40. Short review of the electrical properties of coveragem. I. M. SL'YESTROYA. Ibid., pp. 41–42.—Conductance as a function of temperature for white supplier and the resistance of ceramic corundum bodies are discussed. Cr cantent of rubles. P. I. Parincovskaya. Ibid., pp. 43–46.—Analytical data are given on the introduction of Cr₂O₃ into synthetic corundum from (NH₂)_CCr₂O₃, and special effects of small additions of CaO and MgO (from sulfates) on the color of rubles are described. Cr content of the batch and of synthetic ruby. A. A. Krielay and L. M. Dolgova. Ibid., pp. 47–50.—The losses in Cr₂O₃ from the batch to the powder and the fulshed ruby composition are discussed. Pata on spectral analysis of coundum. S, V. Gaune-Garinnallo. Ibid., pp. 51–56.—Domestic synthetic suppliers are compared with foreign products. The Russian samples are purer, containing less Fe, Cu, and Ca; foreign synthetic corundum products often contain T1 and V, and two samples showed Ns. Only Cr and Mn are higher in domestic corundum products than in the foreign material. Measurement of the refractive indices of synthetic corundum and of corundum batches. N. M. Mislaneholin. Ibid., pp. 57–78.—The immersion method of I. V. Obrehmov (1919) for the determination of very small changes in refractive index is described. Problems of the heating of corundum batches. E. G. Valvasino, A. A. Kieley, And V. A. Linitskil. Ibid., pp. 77–88.—Special studies were made on the transition of γ-Al₂O₃ formed from alum, to corundum with increasing temperature and time of heat exposure,

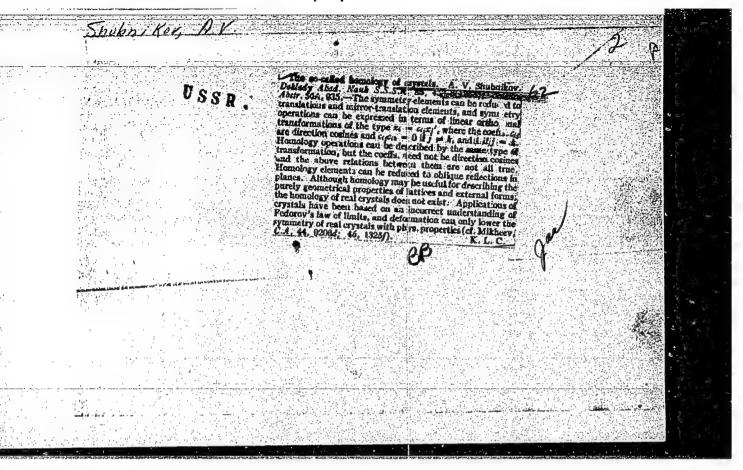
OVER

SHUBNIKOV, A. V.

"New Developments in Rasrer Optics," A.V.Shubnikov, Cor. Mbr., AS USSR, Priroda No 6, pp 20-25, Jun 53.

Describes a system of figures across a raster. Mentions the use of a raster-making instrument which was constructed by V.A.Shamburov. 261T99





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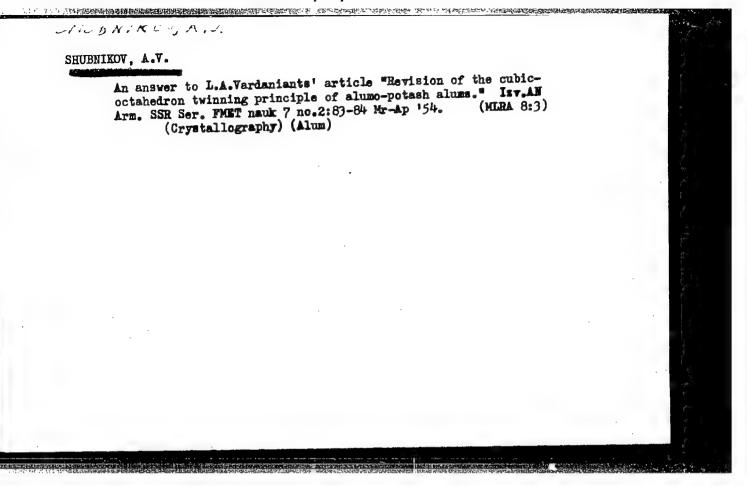
SHUBNIKOV, A.V.

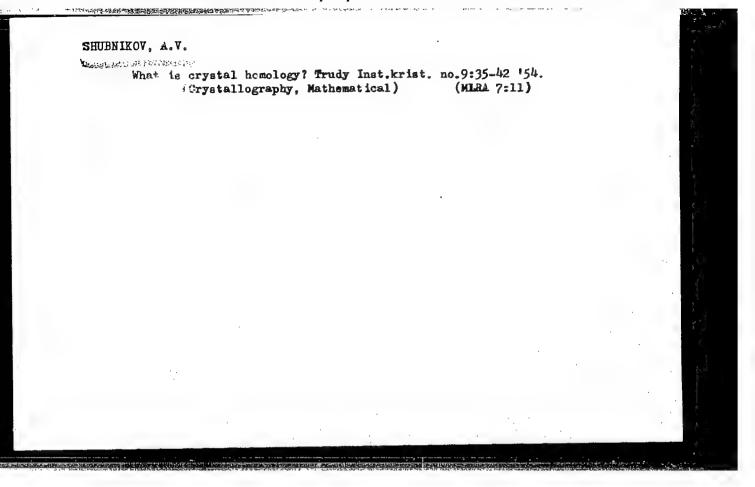
The Tormitter on Stalin Prizer (of the Council of Ministers USSA) in the fields of states on the interest and inventions announces that the following scientific works, popular scientific books, and textbooks have been submitted for competition for Stalin Prizes for the years 1952 and 1953. (Sovetskaya Kultura, Mosnow, No. 22-40, 20 Feb - 3 Apr 1954)

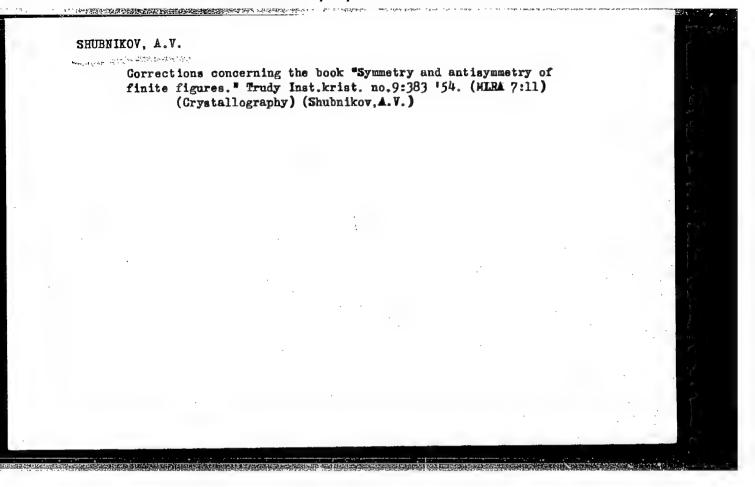
Title of work

Shubnikov, A.V. "Symmetry and Antisymmetry of Finite Prigures"

Institute of Crystallography Academy of Sciences USSR (2)



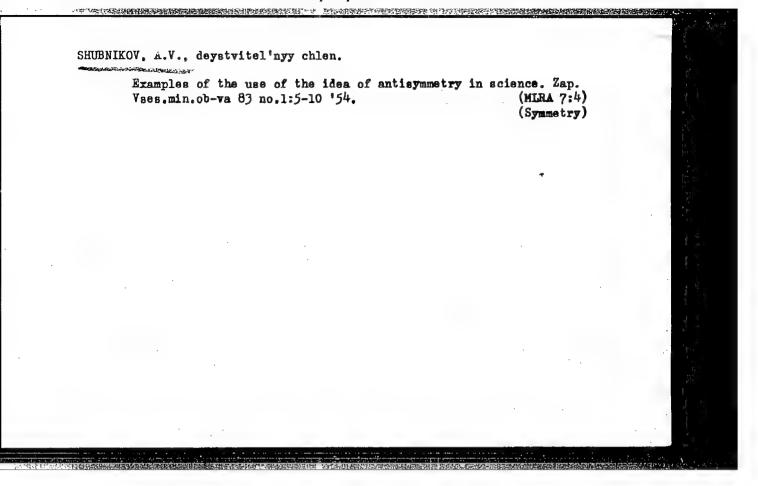


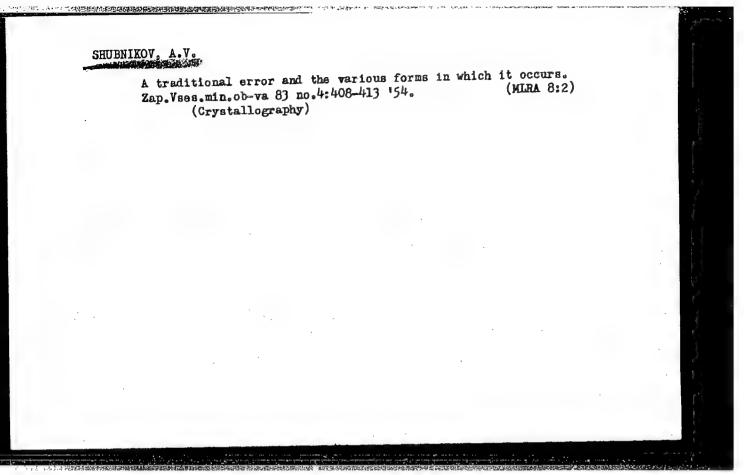


SHUDNIKOV, A.V.

"Asymmetry of Terminal Figures." by A.V. Shibnikov, pp. 799.

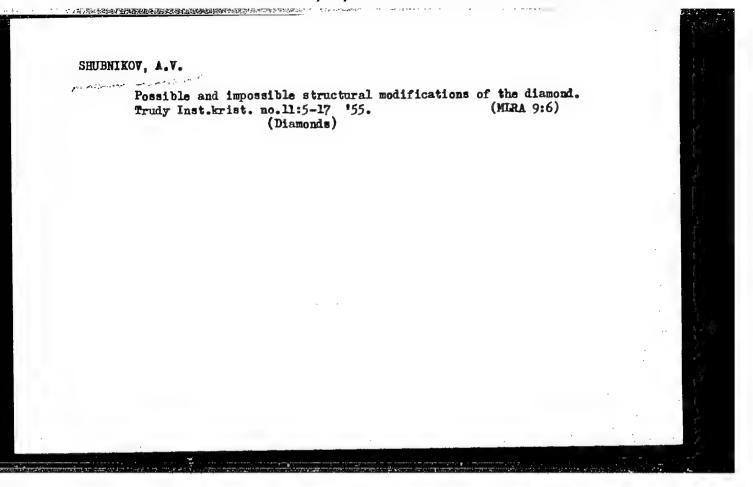
SO: Works of the Inst. of Crystallography, Issue #10, (Reports submitted at at the 3rd International Congress of Crystallography; published by the Acad Sci USSR, Moscow, 1954)





SHUBNIKOV, A.V., akademik; ZHELUDKV, I.S.; KONSTANTINOVA, V.P.;
SILVESTROVA, I.M.; TOLKACHEV, S.S., redaktor; ARONS, R.A.
tekhnicheskiy redaktor.

[Research on piezoelectric crystal patterns] Issledovanie p'ezoelektricheskikh tekstur. Moskva, Izd-vo Akademii nauk SSSR, 1955. 188 p. (MLRA 8:9) (Piezoelectricity)



chubnikov, Av.

USSR/Solid State Physics - Solid State Theory. Geometric Crystallography, E-2

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 34578

Author: Shubnikev, A. V.

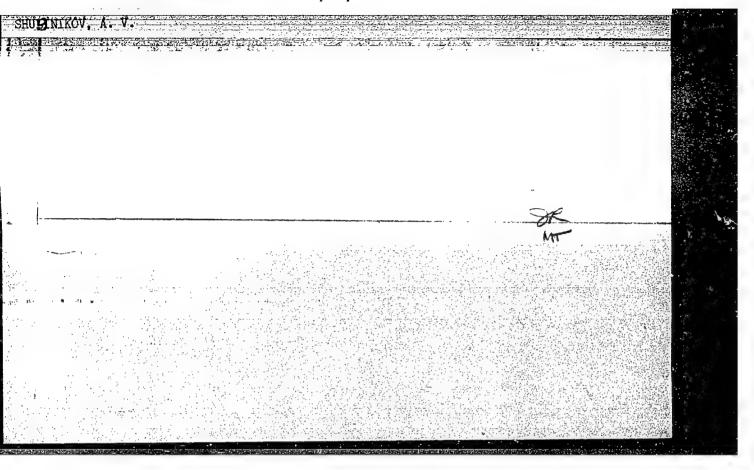
Institution: None

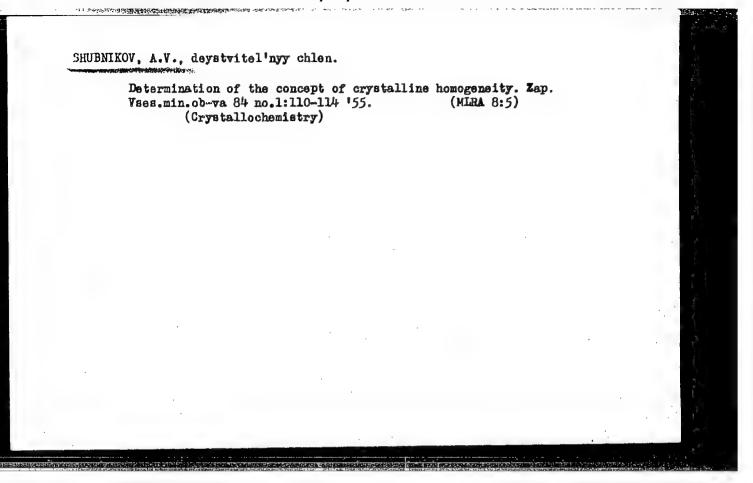
Title: On the Fundamental Law of Crystallography of Ye. S. Fedorov

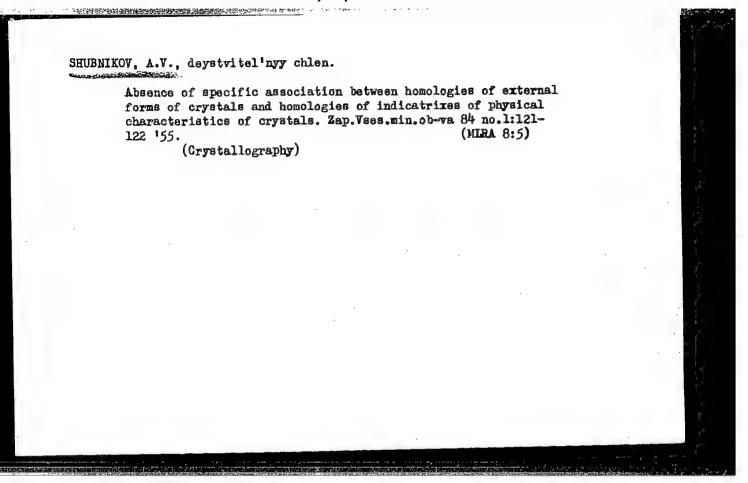
Original Periodical: Tr. In-ta. kristallogr. AN SSSR, 1955, No 11, 18-32

Abstract: Based on examples with known crystal structures, the hypothesis predicted by Fedorov that all crystals consist of identical parallel-arranged particles is subjected to a critical examination. Fedorov drew this conclusion by identifying the parallelohedra with "crystaline molecules," which is not true in general. Ye. S. Fedorov's attempt (after discovery of x-ray-diffraction analysis) to save the plausibility of the "basic law of crystallography" by introducing the concept of the "fundamental parallelohedron" was unsuccessful. Also unsuccessful are the still-continuing efforts undertaken by some of his students to retain Ye. S. Fedorov's incorrect premises. The author indicates the tremendous value of all the basic works by Ye. S. Fedorov to the development of crystallography. He also subjects to criticism those investigations of Fedorov and his students, involving the so-called "basic law of crystallography."

1 of 1





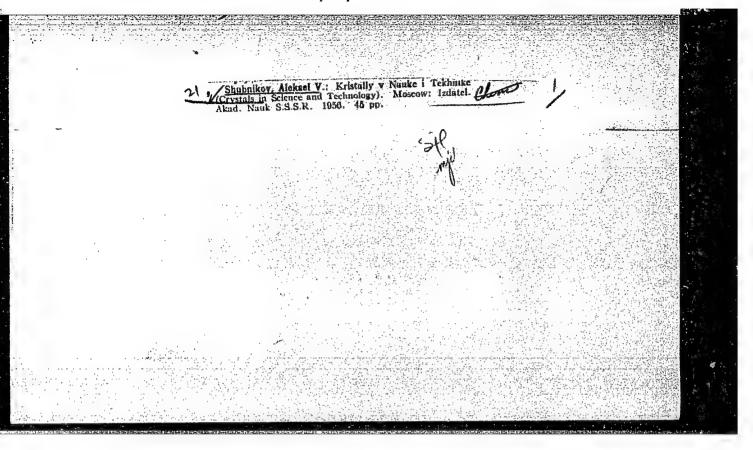


SHUBNIKOV, A. V. Acad

"Crystals in Science and Technology," Acad Sci USSR, 1956

Describes the successes of crystalography. The author reports on the work carried out in the AS USSR Inst. of Crystalography which he directs. Here several crystals which play a very important part in technology are produced artificially.

Yellow book, CC 12, 2 Mar 56



"APPROVED FOR RELEASE: 08/09/2001

CIA-RDP86-00513R001550120006-1

USSR / Theory of Solids. Geometrical Crystallography.

E-2

Abs Jour

Capple of / V

: Ref Zhur - Fizika, No 4, 1957, No 9155

Author

: Shubnikov, A.V. : Institute of Crystallography, Academy of Sciences USSR

Inst Title : Certain Features of Thermal Deformation of Crystals.

Orig Pub

: Kristallografiya, 1956, 1, No 1, 95-104

Abstract

: It is proven that the thermal expansion of crystals cannot be reduced to merely a simple elongation over all directions, drawn through some point taken inside the crystal. The correct picture of thermal deformation of crystals is given by the diagram in which the unit radii of the sphere OA are transformed into radius vectors of the ellipsoid OB with the aid of the displacement vectors AB (see diagram). With this, the coefficients of thermal expansion of the crystals are assumed to be the segments AC rather than the segments AD. The dependence of the cofficient of expansion of the crystal on the direction is given by the formula $\alpha' = \alpha_1 c_1^2 + \alpha_2 c_2^2 + \alpha_3 c_3^2$

Card

: 1/2

SHUBNIKOV. A.V.

MARKET COLUMN

Absence of a definite connection between the homologies of external crystal forms and the homologies of their optical indices. Kristallografiia 1 no.2:246-247 '56. (MLRA 9:11)

 Institut kristallografiia Akademii nauk SSSR. (Crystallography)

CIA-RDP86-00513R001550120006-1 "APPROVED FOR RELEASE: 08/09/2001

THERNING A.L

USSR / Morphology of Crystals. Crystallization.

E-7

Abs Jour

: Ref Zhur - Fizika, No 4, 1957, No 9382

Author

: Shubnikov, A.V.

Inst

: Institute of Crystallography, Academy of Sciences USSR

Title

: Features of Crystallization of Diephenylamine.

Orig Pub

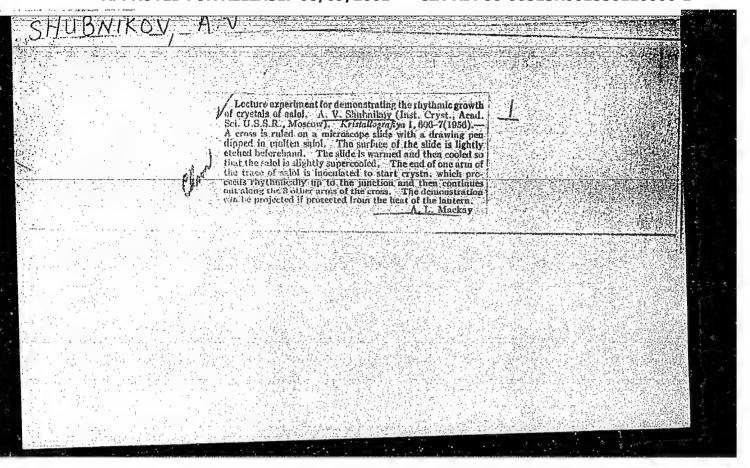
: Kristallografiya, 1956, 1, No 3, 374-375

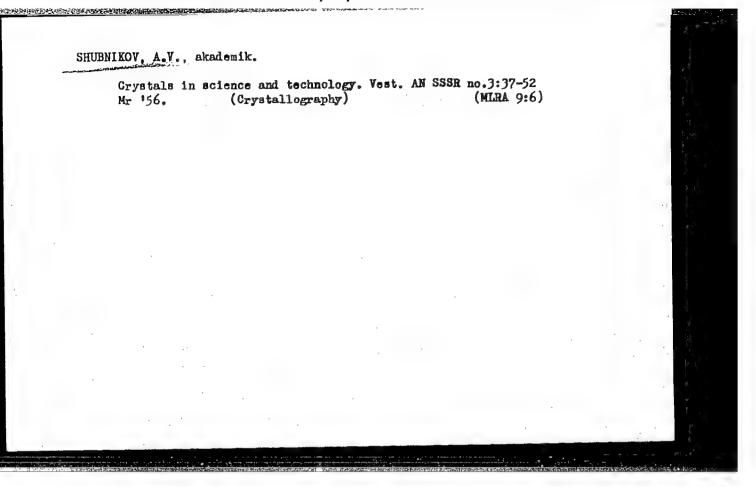
Abstract

: Description of the radially emerging individual crystals (("spherolites") which are obviously not of spherical shape, and which are obtained upon crystallization from a fused mixture of diephenylamine with tarry substances added. There occurs as a result of the branching of the needle-like single crystals of the nuclei with formation of "bifoliates" inside each unit. A procedure is described for preparing the compounds. It is proposed to call the thin radiallyemerging formations, occurring from the single-crystal or twin nucleus, "spherocrystals" to distinguish them from polycrystalline spherolights, which are produced by many nuclei.

Card

: 1/2





F. HUMBER OF ALL

Category: USSR/Solid State Physics - Solid State Thorry. Geometric E-2

Crystallography

Abs Jour : Ref Zhur - Fizika, No 3, 1957, No 6504

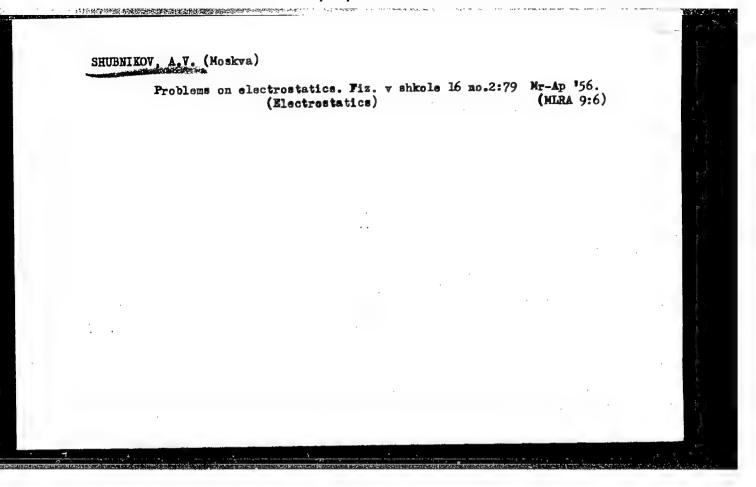
Author : Shubnikov. A.V.

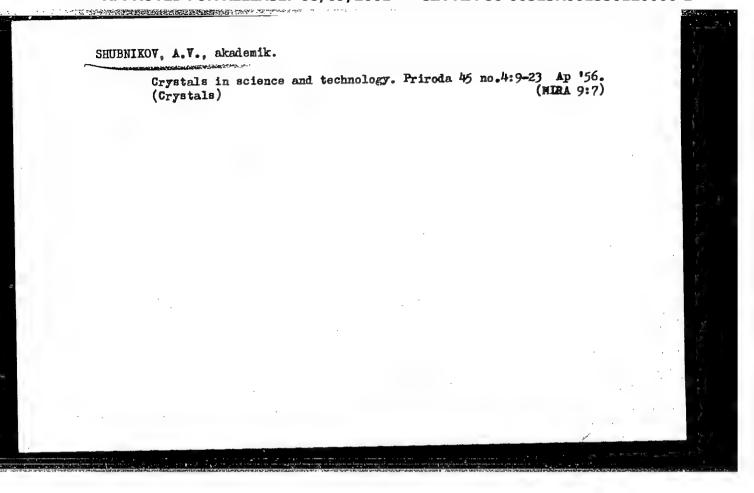
Title : Concerning One Interesting Remark by the Editor

Orig Fub: Tr. In-te kristallogr. AN SSSR, 1956, vyp. 12, 205

Abstract : See Referat Zhur Fizike, 1955, 19027

Card : 1/1





"APPROVED FOR RELEASE: 08/09/2001

CIA-RDP86-00513R001550120006-1

SHUBNIKOV, A.V.

USSR / PHYSICS

CARD 1 / 2

PA - 1503

SHBJECT AUTHOR

On the Works by PIERRE CURIE dealing with Problems of Symmetry.

TITLE PERIODICAL Usp.fis.nauk, 59, fasc.4, 591-602 (1956) Issued: 10 / 1956 reviewed: 11 / 1956

According to the author's opinion CURIE'S works on symmetry are hardly less important than those on radioactivity. PIERRE CURIE was the first to point out the particular importance of those symmetry groups which are now referred to as "groups which are punctiform in the limiting value". The 7 groups concerned are enumerated and described in short. With the help of these symmetry groups P.CURIE was the first to point out one of the most important differences between the electric and the magnetic fields, viz. the inseparability of the opposite magnetic poles. A cylindrical magnet has the symmetry (oo: m) of a rotating cylinder, but the electric analogy of this magnet, the cylindrical dielectricum which is polarized along its axis, has the symmetry (oo. .m) of a cone at rest. It is necessary to distinguish between a coverable and a mirrorlike symmetry. The poles of a magnet are equal to each other from the point of view of symmetry, but this is not the case with the poles of a VOLTA column. According to the author's opinion it is the aim of science to compare what has not yet been compared and to differentiate between what has not yet been differentiated, i.e. to find essential and hitherto unknown criteria of equality and difference. Before PIERRE CURIE physicists displayed more interest in the criteria of similarity than in those of the difference between electricity and

CIA-RDP86-00513R001550120006-1 "APPROVED FOR RELEASE: 08/09/2001

SHUBNIKOV, A.V. Category: USSR/Solid State Physics - Solid state theory. Geometric crystallography

Abs Jour : Ref Zhur - Fizka, No 1, 1957, No 1056

: Can Crystals Exist in Nature, Belonging to One Syngony According to Their Author Symmetry Features, and to Another According to Their Geometric Constants? Title

Orig Pub: Zap. Vses. mineralog. c-va, 1956, 85, No 1, 108-109

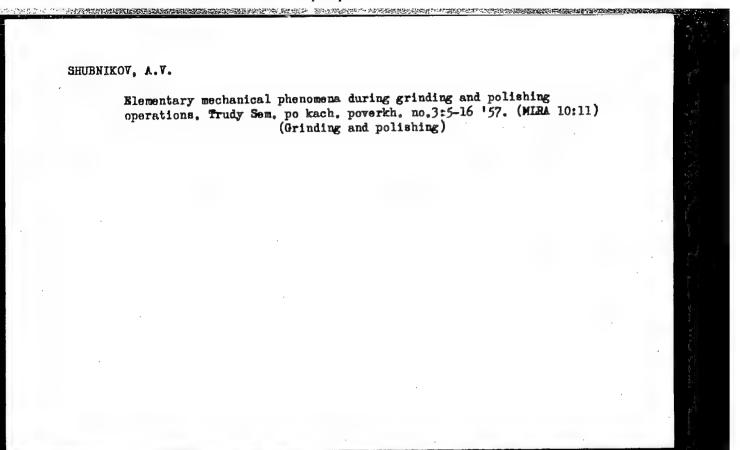
Abstract : Crystals are grouped into syngonies in accordance with two features: symmetry features and the character of their geometric crystal constants a, b, and c. The author states that it is possible for a crystal to belong to one syngony according to his symmetry features, and to another syngory according to its geometric constants. Certain pseudo-symmetrical (pseudo-rhombic, pseudo-tetragonal, etc.) crystals can be classified in lower syngonies according to their symmetry features than in according to the measured constants. The disagreement between the features may be explained by inaccuracies in measurement and particularly by conditions under which the crystals are formed. In many crystals the coefficients of linear expansion have different signs in different directions. In nature, there may be such crystals, for example, pseudo-tetragonal crystals with rhombic syngony, in which the coefficient of expansion has a

Card : 1/2

SHUBNIKOV, A. V.

Institute of Crystallography, Acad. Sc., Moscow"The Splitting of Diphenilamine Crystals Followed by Forming of Spherolites" (Section 14-19) a paper submitted at the General Assembly and International Congress of Crystallography, 10-19 Jul 57, Montreal, Canada.

c-3,800,1**5**9



70-3-17/20 AUTHOR: Shubnikov, A.V.

TTTE: On the formation of spherolites (Ob obrazovanii

sferolitov)

"Kristallografiya" (Crystallography), 1957, PERIODICAL: Vol.2, No.3, pp. 424 - 427 (U.S.S.R.)

ABSTRACT: It is shown in the paper that under certain known conditions, formation of the crystalline unit in the form of a spherolite, completely covered with faces of maximum surface energies, can, from the energy point of view, be more favourable than the formation of columnar or lamellar crystals. The conditions of indifference of the crystalline individium to the lamellar form and to the form of a spher olite are expressed by eqn.(11) and by the graph, Fig. 3; the problem as to whether a lamellar or a spherolite shape is the more favourable from the energy point of view can be solved by the simultaneous solution of the eqns. (3) and (10. If the surface energy of the spherolite formed from a lamellar crystal $\mathbf{E}_{s}^{"} > \mathbf{E}_{k}$ (total surface energy of the crystal), the lamellar form will be more stable, whilst for $E_g \in E_k$, the spherolite form will be more

Card 1/2

The author investigated only the influence of the 2 factors v_i (speed of growth of the face) and σ_i (specific

On Nuclear Forms of Spherulites.

70-5-2/31

there is no cavity. If the deviation is great then the cavities may be filled in by spirals. The axial symmetry (hexagonal for example) of the initial nucleus may show itself in the symmetry of the double-mushroom-shaped spherulite. There are 9 figures and 11 references, 6 of which are Slavic.

ASSOCIATION: Institute of Crystallography Ac.Sc. USSR.

(Institut kristallografii AN SSSR)

SUBMITTED: May 3, 1957.

AVAILABLE: Library of Congress

Card 2/2

Suchez For Al

AUTHOR:

Shubnikov, A.V., Academician

4-11-15/34

TITLE:

Young Friends! (Yunyye druz'ya!)

PERIODICAL:

Znaniye - Sila, 1957, # 11, p 15 (USSR)

ABSTRACT:

The short article deals with the new science of crystallography and explains for what purposes the artificial crystals of the ruby, diamond, quartz, etc. are being used. It states that the research of crystals is directly connected with important problems of biology: the study of the structure of albumins and the elementary processes of life.

There is I figure.

AVAILABLE:

Library of Congress

Card 1/1

SHUBNIKOV, A.V. (Moskva)

Problems related to Ohm's law. Fiz. v shkole 17 no.2:81 Mr-Ap '57.

(MIRA 10:3)

(Electric resistance---Froblems, exercises, etc.)

ALTERNATION OF THE PROPERTY OF

PHASE I BOOK EXPLOITATION 799

Shubnikov, Aleksey Vasileyevich, Academician

Kristally v nauke i tekhnike (Crystals in Science and Technology)
2nd ed., enl. Moscow, Izd-vo AN SSSR, 1958. 49 p. (Series:
Akademiya nauk SSSR. Nauchno-populyarnaya seriya) 15,000
copies printed.

Resp. Ed.: Belov, N.V., Academician.

PURPOSE: The booklet is intended to give the general public an idea of the achievements of the Institut kristallografii AN SSSR (Institute of Crystallography, AS USSR) in various areas of crystallography.

COVERAGE: The booklet deals with the achievements of members of the Institute of Crystallography, AS USSR, in the areas of crystallography given below: Symmetry and antisymmetry: B.K.

Card 1/5

Crystals in Science and Technology

Vaynshteyn used antisymmetry to determine the structure of crystals; N.V. Belov, A.M. Zamorzayev, B.A. Tavger and V.H. Zaytsev developed this method. X-ray analysis: Under the direction of N.V. Belov, Ye.N. B.lova was first to determine by means of X-ray analysis the structure of tourmaline, and Kh.C. Mamedova those of wallastonite and xonotlite. I.M. Rumanov, N.I. Golovastikov and R.F. Smirnova assisted N.V. Belov in developing the method of x-ray analysis. Structural electronography: Z.G. Pinsker and B.K. Vaynshteyn demonstrated the possibility of using electronography for the determination of crystal structures. Formation of crystals: V.R. Regel' designed a model illustrating the elementary processes accompanying the growth of crystals which are known as dislocations. G.G. Lemmleyn should be considered as one of the initiators of studies on the spiral growth of crystals. Under his guidance, Ye.D. Dukova established the reverse quantitative ratio between the height of spiral steps and the tangential speed of their growth.

Card 2/5

Crystals in Science and Technology

Another worker, M.O. Kliya assisted Lemmlevn in his studies on the formation of the so-called balanced form of a crystal. Piezoelectricity: A.S.Shein was the first to obtain piezoelectric structures from Rochelle salt. Description is given of new acoustic radiators designed by A.S. Shein. Seignettoelectric crystals: M.A. Chernysheva and I.S. Zheludev are mentioned for their studies on the formation and disappearance of domain structures. Method of analyzing clays by means of dyes: The method is based on the studies of N.Ye. Vedeneyeva. Investigations in the field are described in the num erous works of S.V. Grum - Grzhimaylo and N.M. Melankholin. Polaroids: Under the guidance of G.I. Distler, the Institute is developing thermoresistant polaroids capable of withstanding prolonged heating at 120 - 130°C without change of properties. Light filters for astronomic observations: The first Soviet light filter was built by member of Institute A.B. Gil'bert with the assistance of Professor A.B. Severnyy. X-ray Spectographs:

Card 3/5

Crystals in Science and Technology

799

Under the guidance of K.I. Narbutt, E.Ye. Vaynshteyn, A.B. Gil'varg and L.M. Belyayev, the Institute has designed and introduced into a number of establishments new models of x-ray spectographs with concave crystals. Luminescent crystals: Under the guidance of L.M. Belyayev and with participation of B.V. Vitovskiy, G.F. Dobrzhanskiy and P.P. Reznikov, the problem of growing luminiscent crystals from a number of organic and inorganic substances has been solved by the Institute. thetic corundum crystals: S.K. Popov, N.Yu. Ikornikova and A.A. Popova are mentioned for their achievements in the manufacture of synthetic rubies. Synthetic quartz crystals: N.N. Sheftal' and V.P. Butuzov have demonstrated the possibility of manufacturin good quality synthetic quartz in industrial quantities. twinning of quartz: Ye.V. Tsinserling has worked out the method of transforming quartz twins into monocrystals. and strength of crystals: A.A. Urusova, under the guidance of Plasticity M.V. Klassen - Neklyudova, is investigating mixed thallium iodide and thallium bromide crystals. In a recent work V.L. Indenbom and G.Ye. Tomilovskiy have apparently succeeded in establishing Card 4/5

PHASE I BOOK EXPLOITATION

739

Shubnikov, Aleksey Vasil'yevich, Academician

Osnovy opticheskoy kristallografii (Principles of Optical Crystallography) Moscow, Izd-vo AN SSSR, 1958. 204 p. 4,000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut kristallografii.

Ed. of Publishing House: Kuznetsova, Ye.B.; Tech. Ed.: Kashina, P.S.

PURPOSE: This book is intended for university students in the field of crystallography, especially the optical properties of crystals.

COVERAGE: This book is devoted to that branch of crystallography which deals with the optical properties of crystals. Its content corresponds to the course in optical crystallography

Card 1/10-

Principles of Optical Crystallography 739

given by the Moscow University Department of Physics. The subjects covered by the author include: the optics of isotropic transparent media, double refraction, light interference in crystal plates, rotation of the plane of polarization, elliptical polarization and elliptical double refraction, conical refraction, and double absorption of light in crystals. Recognization is given to N.M. Melankholin for his careful review of the manuscript and for a series of valuable suggestions. There are no references.

3

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TABLE OF CONTENTS:

The Subject of Optical Crystallography	
Basic Data From the Optics of Isotropic Transparent Media The laws of reflection and refraction Total internal reflection Dispersion of light	
Light waves	ě
Simplest wave model	1
Refraction of light from the point of view of the wave theory	{

Card 2/10

"APPROVED FOR RELEASE: 08/09/2001

CIA-RDP86-00513R001550120006-1

SHUBNIKOV, AV

· AUTHOR:

None Given

SOV-26-58-8-34/51

TITLE:

Lectures (Delivered) by Soviet Scientists at the Brussels Exhibition (Lektsii sovetskikh uchenykh na Bryussel'skoy

vystavke)

PERIODICAL:

Priroda, 1958, Nr 8, p 116 (USSR)

ABSTRACT:

In August 1958, the greatest Soviet scientists will deliver lectures on the achievements of science in the USSR at the Brussels Fair. In the field of natural sciences the following will lecture: the academicians Semenov, N.N. on Chain Reactions in Chemistry, V.N. Kondrat'yev on Soviet Works on Mass-Spectroscopy, A.P. Vinogradov on the Biochemistry of Isotopes, A.V. Shubnikov on the Growth of Crystals, N.S. Shatskiy on the Tectonic Map of the USSR, A.I. Oparin on the Present State of the Problem on the Origin of Life, Tsitsin, N.V. on Problems of Distant Hybridization, I.V. Tyurin on Soils of the Soviet Union and their Utilization. The following lectures will be delivered by correspondentmembers AS USSR N.M. Emanuel' on New Investigations in the Field of Chain Reactions, Andrianov, K.A. on Silicoorganic Compounds, Ye.K. Zavoyskiy on Phenomena of Electron Paramagnetic Resonance, I.M. Frank on the Application of Atomic Energy for Peaceful Purposes, V.I. Popkov on a Unique Ener-

Card 1/2

AUTHOR: Shubnikov, A.V.

70-3-3-1/36

TITLE: The Antisymmetry of Textures (Antisimmetriya tekstur)

PERIODICAL: Kristallografiya, 1958, Vol 3, Nr 3, pp 263 - 268 (USSR)

Diagrams representing these groups are reproduced but examples Card1/2 of the real textures are not discussed.

"APPROVED FOR RELEASE: 08/09/2001 CIA-RDP86-00513R001550120006-1 。 第一种主义,我们是是一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们

The Antasymmetry of Textures

70-3-3-1/36

There are 4 figures and 4 Soviet references.

ASSOCIATION:

Institut kristallografii AN SSSR (Institute of Crystallography, Ac.Sc. USSR)

SUBMITTED:

February 3, 1958.

Card 2/2

CIA-RDP86-00513R001550120006-1" APPROVED FOR RELEASE: 08/09/2001

AUTHOR: Sh

Shubnikov, A.V.

ALERSON ASSESSED AND ASSESSED ASSESSED OF A SOLUTION OF THE PROPERTY OF THE PR

SOV/70-3-4-17/26

TITIE:

Rhythmic Growth of Spherulites of Triphenylmethane (Ritmicheskiy rost sferolitov trifenilmetana)

PERIODICAL: Kristallografiya, 1958, Vol 3, Nr 4, pp 499-501 (USSR)

ABSTRACT: If triphenylmethane containing 10-15% rosin is melted on a microscope slide (m.p. 92.5°C) and one drop is transferred on a needle point to a metal plate and the drop is cooled as rapidly as possible with an air jet, then spherulitic growth of the triphenylmethane can be observed with a microscope. Both rings and spirals are observed. The rings arise from rectilinear "waves" oscillating in the surface of the spherulite. These waves spread from points far from the limits of the growing spherulite and in the process of growth the spherulite itself bends these waves into circles. The waves are not visible in polarised light between crossed Nicols. That these waves are really waves of freezing can be confirmed by the sharp system of waves seen both when the microscope is focused on the troughs and on the crests. Each component of the

card 1/2

Rhythmic Growth of Spherulites of Triphenylmethane SOV/70-3-4-17/26

waves is seen to act like a cylindrical lens. for the formation of the waves remains obscure. The reasons There are 4 figures and 4 references, 3 of which are German and 1 English.

ASSOCIATION:

Institut kristallografii AN SSSR (Institute of

Crystallography of the Ac.Sc.USSR)

SUBMITTED:

May 12, 1958

Uard 2/2

Shubnikov, A.V. AUTHOR:

SOV/70-3-4-26/26

TITLE:

The Own Idelified Symmetry of Atoms and Molecules in a

Crystal (O sobstvennoy simmetrii atomov i molekul

v kristalle)

PERIODICAL: Kristallografiya, 1958, Vol 3, Mr 4, pp 521 - 524 (USSR)

ABSTRACT: Illustrations are given to bring out the differences between the "own symmetry" of an atom, chemical group, between the "own symmetry" and its "forced" crystal or biological structure and its symmetry". The former is the symmetry which the object has of itself in isolation from all disturbing influences such as force fields due to its surroundings. It is to some extent an idealisation as these conditions can never be achieved in practice although the means used for detecting the symmetry may be insensitive to the disturbing elements. For example, the crystal symmetry as shown by X-ray photographs is generally examined in a gravity field which will reduce the symmetry of the whole arrange-The difference from the ideal is, however, almost always negligible when due to this cause. K-ray methods show the symmetry of the electron cloud and not that of the whole structure. Neutron diffraction may detect lowered

Card 1/2

The Own [defined] Symmetry of Atoms and Molecules in a Crystal

symmetry in the arrangement of the electron spins to which the X-ray method is indifferent. The "forced symmetry" is the actual symmetry of the object considering the external conditions and its surrounding which distort it from the "own" symmetry. In practice, the case of true "own symmetry" never really occurs but, as this is obviously a useful concept, it continues to be used. The confusion is generally a purely verbal one and in actual experimental work little difficulty occurs.

There are 2 figures and 5 references, 2 of which are German, 2 English and 1 Soviet.

ASSOCIATION:

Institut kristallografii AN SSSR

(Institute of Crystallography Ac.Sc. USSR)

SUBMITTED:

May 21, 1958

在1000年,1000年,1000年,1000年,1000年,1000年,1000年,1000年,1000年,1000年,1000年,1000年,1000年,1000年,1000年,1000年,1000年,1000年,1

Card 2/2

SHUBNIKOV, A. V., PARVOV, V. F.

"The Formation of Crystals"

a report presented at Symposium of the International Union of Crystallography, Leningrad, 21 - 27 May 1959.

AUTHOR:

Shubnikov, A.V.

SOV/70-4-3-1/32

TITLE:

The Symmetry and Antisymmetry of Rods and Semi-continua with Principal Axes of Infinite Order Along Which There are

Finite Translations

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 3, pp 279 - 285 (USSR)

ABSTRACT: The 25 symmetry and antisymmetry groups which describe rods and semi-continua are tabulated. There are seven grey, seven one-coloured and eleven black and white groups. groups of the corresponding layered semi-continua are obtained by combining the rod groups with the groups of possible translations in directions perpendicular to the main axis of the rod. The symmetry of objects having a sign (+ or -) and a hand (d or 1) has been examined earlier but the restricted case of rods and semi-continua is of interest for describing textures. The following groups apply to rods: $(\infty)\tau$; $(\infty)\tilde{\tau}$; $(\infty \cdot m)\tau$; $(\infty \cdot m)\tau$; $(\infty : m)_{\mathcal{T}}; (\infty : 2)_{\mathcal{T}}; (m \cdot \infty : m)_{\mathcal{T}} \text{ where } \infty \text{ is an axis of infinite order, } m \text{ a plane of symmetry, } \mathcal{T} \text{ as}$

axis of finite translations, t a mirror axis of Card1/3

translations, a dot is a sign of parallelism and a colon

The Symmetry and Antisymmetry of Rods and Semi-continua With Principal Axes of Infinite Order Along Which There are Finite Translations

a sign of perpendicularity. These are the seven one-coloured groups. These are now combined with the # and (d, l) operations. Each of the 7 can be + or - and (∞)? and (∞ : 2) can also be d or \(\). Of the 18 groups, those from (∞) \(\tau, (∞) \(\tau, (∞ , m) can be said to be single-layered, those from (∞ : m) double-layered, those from (∞ : m) four-layered and the remainder double-layered. The grey groups are (∞) \(\tau) (d and l); (∞) : (∞) : m) \(\tau; where ∞ is the anti-axis. The black and white groups are obtained by substituting the operations \(\text{m} \times \text{ and } \times \text{ for m}, \(\tau \text{ and } \times \text{ and } \times

Card2/3

The Symmetry and Antisymmetry of Rods and Semi-continua with Principal Axes of Infinite Order Along Which There are Finite Translations

(1 and d); (の)元 (+ and -); (の. m)で; (の:m)で (+ and -); (の:m)で; (の:m)で; (の:m)で; (の: m)元 (+ and -); (の:2)で (1 and d); (の:2)元 (1 and d); (m. の: m)で; (m. の: m)で. There are 3 figures and 9 references, of which 5 are Soviet and 4 German.

ASSOCIATION: Institut kristallografii AN SSSR (Institute of Crystallography of the Ac.Sc., USSR)

SUBMITTED: I

December 29, 1958

Card 3/3

"APPROVED FOR RELEASE: 08/09/2001

CIA-RDP86-00513R001550120006-1

sov/70-4-3-2/32

AUTHOR:

The Full Systematics of the Point Groups of Symmetry

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 3, pp 286-288 (USSR)

ABSTRACT: The three-dimensional point groups are set out in

First category - N (N = 1, 2, ... ∞); N:2 (N = 1, 2, ... (N-m); 3/2, 3/4, 3/5 and ∞/∞ . Second category (N-m); N:m $(N=1, 2, ...\infty)$ and

 \bar{N} (N = 2, 4, ... ∞ , even integers only); m.N:m $(N = 1, 2, \dots, \infty)$ and N.m. $(N = 2, 4, \dots, \infty)$ even integers only); 6/2, 3/4, 6/4, 3/10, 00/00.m. Only essential generating elements of symmetry enter into the group designations. N denotes a simple axis of symmetry of order N and \bar{N} an inversion axis. m is a mirror plane of symmetry. A dot between two elements denotes their parallelism and a colon their perpendicularity. An oblique stroke indicates an oblique inclination. first category contains may first-order (proper) operations; the second category contains both first and second-order

Card1/2

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78092 S0V/70-5-1-1/30

AUTHOR:

Shubnikov, 4. V.

TITLE .

Prospects of the Development of Crystallography in the Light of Decisions of the 21st Congress of the Communist Party of the Soviet Union

PERIODICAL:

Kristallografiya, 1960, Vol 5, Nr 1, pp 3-14 (USSR)

ABSTRACT.

Since the Congress decisions mention the necessity of the development of solid state physics and chemistry of high polymers, both subject to the laws of structure transformations, the author believes that crystallographers iccupying a transitional field between chemistry and physics should investigate the following: (1) the laws controlling crystallization; (2) the laws of atomic and relecular structures and the dependence of properties on structure, (3) the laws that govern interaction between the matter of a crystal and environment, and (4, production and structure of the crystals deeded for modern instruments. A number of specific problems of the four subjects are discussed.

Card 1/2

SHUBNIKOV, A.V.

Time inversion as an antisymmentry operation. Kristallografiia 5 no.2:328-333 Mr-Ap '60. (MIRA 13:9)

1. Institut kristallografii AN SSSR. (Crystallography)

"APPROVED FOR RELEASE: 08/09/2001

CIA-RDP86-00513R001550120006-1

s/070/60/005/004/001/012 E132/E360

AUTHOR:

公司公司的政治的政治是在1000年的公司的政治中国中

The Symmetry of Similarity (Preliminary Communication) Kristallografiya, 1960, Vol. 5, No. 4, TITLE: PERIODICAL:

The study of sequences of similar figures where a steady magnification or diminution takes place has a very long history. The golden section has received particular attention and the phenomena of phyllotaxis have long attracted mathematicians. possibility of the mathematical treatment of similarity was suggested by H. Weyl ("Symmetry", 1952). Figures of the same form but of different sizes are related by similarity operations. The operation K translated an object through a distance n times the previous translation and magnifies it n times. It follows that there is a special vanishing point through which all straight lines joining corresponding points of each object pass. operation Lagives successive rotations of the figure about a fixed axis through an angle ϕ followed by the operation K . ϕ may be rationally or irrationally related to 2%. Here corresponding points will lie on a logarithmic spiral. When $\phi=2\pi$, then

Card 1/3

S/070/60/005/004/001/012 E132/E360

The Symmetry of Similarity (Preliminary Communication) The operation M' provides a mirror reflection in a plane of similarity thus giving two series of objects, each generated by K operations, one on each side of the similarity plane. The operation N produces three dimensional figures and can be regarded as the product of the operations K and L acting in perpendicular directions. Examples of these operations are illustrated. These various operations can be combined into similarity symmetry groups by adding ordinary symmetry operations to the above. A number of these groups, which are essentially plane point groups, are listed. Besides applications in art and architecture the theory has obvious importance for the morphological description of living organisms. The rhythmic phenomena of crystal growth may also be susceptible to this sort of description. There are 20 figures and 9 references: 2 Soviet, 5 English,

1 French and 1 German.

Card 2/3

S/070/60/005/004/016/016/XX E132/E460

AUTHOR:

Shubnikov, A.V.

CONTRACTOR OF THE PROPERTY OF

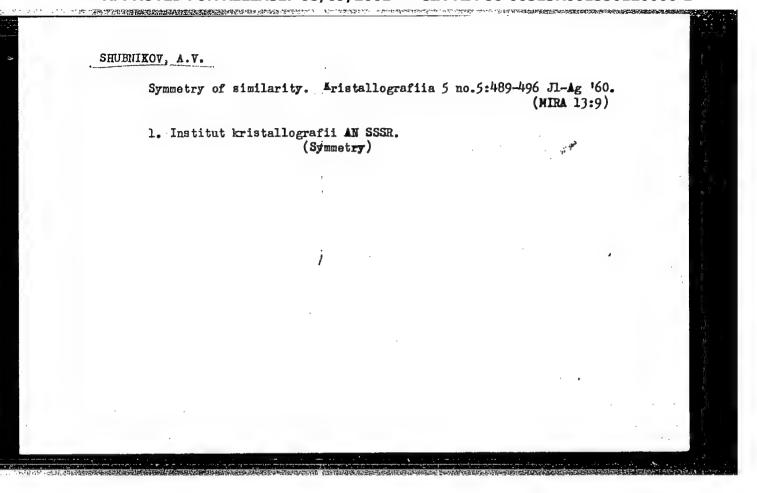
TITLE:

On the Determination of the Sign of the Enantiomorphism

of Piezoelectric Textures

PERIODICAL: Kristallografiya, 1960, Vol.5, No.4, pp.644-645

Of those textures which have an axis of infinite order only those which have an axis of symmetry, namely 00, 00:2 and 60 /60, can be enantiomorphous. A rule has been found experimentally for telling right-handed textures of Rochelle salt enantiomorphous textures of the from left. This shows that class 30:2 can be distinguished with only one piezoelectric The knowledge can then be used for solving several experiment. problems connected with the dissymmetry of living matter. been shown earlier that wood has the texture symmetry 60:2 that it obeys the opposite rule to that followed by Rochelle salt. V.A.Bazhenov (Ref.4) has studied some 1100 specimens of many kinds of wood and has found no exception to the rule that all wood belongs to the left-handed enantiomorphous modification. associates this with the presence of cellulose in all woods. does not follow that the occurrence of the right-handed form is Card 1/2



SHUBNIKOV, Aleksey Vasil'yevich, akad.; IOFFE, V.G., red. izd-va; ROMANOV,

G.N., tekhn. red.

[Problem of the dissymmetry of material objects] Problema dissemmetrii material'nykh ob"ektov. Moskva, Izd-vo Åkad. nauk SSSR,
1961. 54 p.

(Symmetry)

(Symmetry)

SHUBNIKOV, A.V.

Reciprocally parallel arrangement of the dendrites of ammonium chloride in a drop of solution. Kristallografiia 6 no.2:244-248 Mr-Ap '61. (MIRA 14:9)

1. Institut kristallografii AN SSSR. (Ammonium chloride crystals)

SHUBNIKOV, A.V.

Symmetry and physical properties of cones of growth. Kristallografia 6 no.3:319-322 My-Je '61. (MIRA 14:8)

1. Institut kristallografii AN SSSR. (Crystals--Growth)

SHUBNIKOV, A.V.; PARVOV, V.F.

Generation of crystallization centers in a drop of ammonium chloride solution under the action of an electric field.

Kristallografiia 6 no.3:443-450 My-Je '61. (MIRA 14:8)

1. Institut kristallografii AN SSSR.

(Ammonium chloride) (Electric fields)

(Crystallization)

SHUBNIKOV, A.V.

Complete systematics of the black-white point groups. Kristallografits 6 no.4:490-495 Jl-Ag '61. (MIRA 14:8)

1. Institut kristallografii AN SSSR. (Crystallography)

KAPUSTIN, Aleksandr Pavlovich; LEMLEYN, G.G., prof., retsenzent; KUDRYAVTSEV, B.B., prof., retsenzent; SBITNIKOVA, I.S., red. izd-va; SHUENIKOV, A.V., akademik, otv. red.; SIMKINA, G.S., tekhn.red.

[Effect of ultrasound on the kinetics of crystallization]
Vliianie ul'trazvuka na kinetiku kristallizatsii. Moskva,
Izd-vo Akad. nauk SSSR, 1962. 106 p. (MIRA 15:3)
(Ultrasonic waves) (Crystals—Growth)

GAYUI, Rene Zhyust [Hauy, Rene-Just]; SHAFRANOVSKIY, I.I., prof.;

ZABOTKINA, O.S.[translator]; STRATANOVSKIY, G.A.[translator];

SHURNIKOV, A.V., akademik, red.; BOKIY, G.B., red.;

PETROVSKIY, I.G., akademik, red.; ANDREYEV, N.N., akademik, red.;

KAZANSKIY, B.A., akademik, red.; YUDIN, P.F., akademik, red.;

DELONE, B.N., red.; SAMARIN, A.M., red.; ZUBOV, V.P., prof., red;

LEBEDEV, D.M., prof., red.; FIGUROVSKIY, N.A., prof., red.;

KUZNETSOV, I.V., kand. filos. nauk, red.; OZNOBISHIN, D.V., kand.

istor. nauk, red.; SUSHKOVA, T.I., red. izd-va; SMIRNOVA, A.V.,

tekhn. red.

[Structure of crystals; selected works] Struktura kristallov; izbrannye trudy. Sostavlenie, stat'ia i primechaniia I.I. Shafranovskogo. Redaktsiia A.V.Shubnikova i G.B.Bokiia. Moskva, Izd-vo Akad. nauk SSSR, 1962. 175 p. Translated from the french.

(MIRA 15:3)
1. Chlen-korrespondent Akademii nauk SSSR (for Bokiy, Delone, Samarin).

(Crystallography)

"APPROVED FOR RELEASE: 08/09/2001

CIA-RDP86-00513R001550120006-1

3631 Z/037/62/000/002/012/015 E073/E535

9,2180

AUTHOR: Shubnikov, A.V.

TITE: liezo-electric textures and the prospects of further

development of piezo-electricity

PERIODICAL: Československý časopis pro fysiku, no.2, 1962, 172-174

TEXT: Of the infinite number of textures of the general type, textures with symmetry axes are of interest in piezo-electric studies. These textures can be sub-divided into seven symmetry groups, of which three may prove to have piezo-electric properties. These three piezo-electric symmetry groups are designated of these three piezo-electric symmetry groups are designated of the piezo-electric textures made of Rochelle salt and barium titanate and a clectric textures made of Rochelle salt and barium titanate and a brief description of the manufacture of these is given. The author anticipates the emergence of a number of new textures, since theoretically piezo-electric textures with any crystallographic or non-crystallographic symmetry may exist. Recently, a piezo-electric phenomenon was observed in a certain type of perspex during its deformation; this texture consists basically of long molecules in a regular arrangement. The author predicts that Card 1/2

S/070/62/007/001/001/022 E132/E460

AUTHOR: Shubnikov, A.V.

TITLE: The groups (classes) of symmetry and antisymmetry of

finite strips

PERIODICAL: Kristallografiya, v.7, no.1, 1962, 3-6

TEXT: The possible symmetries of long plates are considered. The thickness of these plates is infinitely small but each side may have a figure in low relief on it. All the groups are subgroups of the orthorhombic group mmm. There are 16 groups of ordinary symmetry and a further 35 if black and white symmetry is considered. Because of the distinction between the three axes of the band there may be three groups with symmetry m with the place perpendicular to the three axes in turn; this increases the total from 8 to 16 and correspondingly for the black and white groups.

ASSOCIATION: Institut kristallografii AN SSSR

(Institute of Crystallography AS USSR)

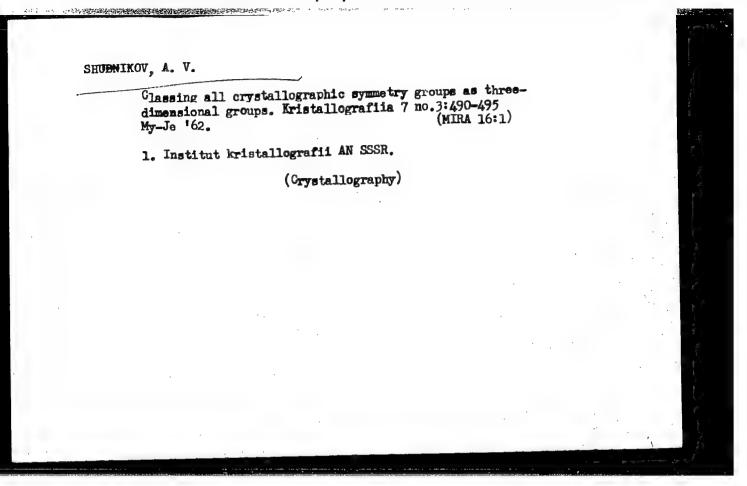
SUBMITTED: October 23, 1961

Card 1/1

SHUBNIKOV, A.V.

Black-white groups of infinite bands. Kristallografiia 7 no.2:
186-191 Mr-Ap '62.

1. Institut kristallografii AN SSSR.
(Crystallography)



"APPROVED FOR RELEASE: 08/09/2001

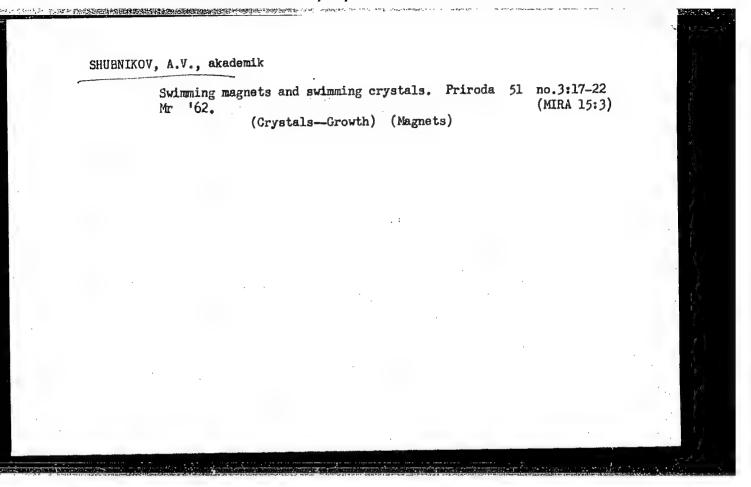
CIA-RDP86-00513R001550120006-1

SHUBNIKOV, A. V.

SUBNIKOV, A. V.

Frezoelectric textures and the outlook for development of piezoelectricity. Cs cas fys 12 no. 2:172-174. '62.

1. Ustav krystalografie Akademie ved S. S. S. R.



SHUENIKOV, A.V.

Incompleteness of the "unified system of crystallographic groups."

Kristallografiia 8 no.1:131-132 Ja-F'63 (MIRA 17:7)

1. Institut kristallografii AN SSSR.

SHUBNIKOV, A.V.

What information is contained in a regular system of points?

Kristallografiia 8 no.6:943-944 N-D'63. (MIRA 17:2)

1. Institut kristallografii AN SSSR.

PARVOV, V.F.; SHUBNIKOV, A.V.

Zero growth velocity faces in $K_2Cr_2O_7$. Kristallografiia 9 no.3:435-436 My-Je '64. (MIRA 17:6)

1. Institut kristallografii AN SSSR.

SHUBNIKOV, A.V., akademik

Globular model of the structure of crystals and amorphous bodies. Priroda 53 no.10:77-80 '64. (MIRA 17:11)

1. Institut kristallografii AN SSSR, Moskva.

L 22538-65 EWT(m)/EPF(n)-2/EWP(t)/EWP(b) Pu-4 IJP(c) ES/WW/JD/JO ACCESSION NR: AP4042794 S/0020/64/157/003/0583/0585

AUTHOR: Dy*mkov, Yu. M.; Shubnikov, A. V.

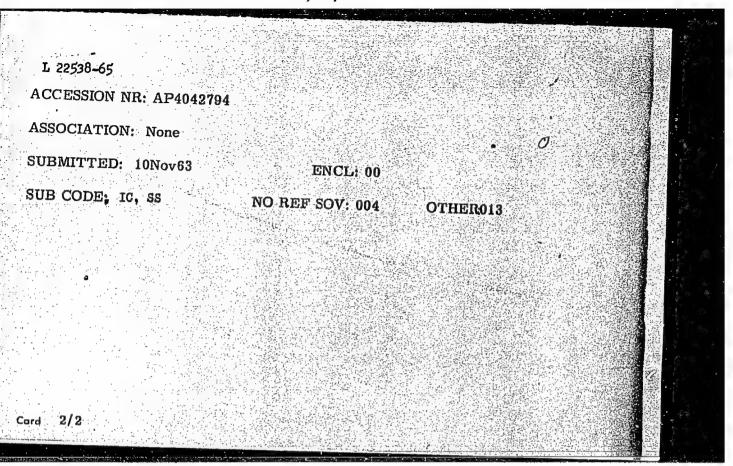
TITLE: On the epitaxial transformation of $U_3O_8 \longrightarrow UO_{2+x}$ in uranites

SOURCE: AN SSSR. Doklady*, v. 157, no. 3, 1964, 583-585

TOPIC TAGS: epitaxial transformation, uranite, crystallography, uraninite, uranium compound

ABSTRACT: It has been suggested (R. M. Berman, Am. Mineral, 42, 705 (1957)) that the uranite was first precipitated as U_3O_8 , and then transformed into UO_{2+x} . The author finds support for this suggestion in the microscopic analysis of etched uranites. The suggested transformation permits a distinct separation of uranite from uraninite. While the first was precipitated as a noncubic mineral U_3O_8 (and possibly as U_2O_5), and then in steps transformed into UO_{2+x} , the latter crystallized as a cubic mineral $U_4O_9 - UO_{2+x}$ or UO_2 . Orig. art. has: 2 figures

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